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PC Standard in the Cards

BY TOM WOLFE

AGREEMENT AT HAND FOR IC-BASED STORAGE MEDIUM

PC standard in the cards

By DAVID LAMMERS

Tokyo — Agreement could be imminent on a Japan-U.S. standard for the "PC Card," a 2 × 3-inch IC-based card to be used as a removable data-storage medium for portable computers.

Expectations are high that this transPacific standard will do for notebook and laptop computers what MS-DOS, the floppy disk and the IBM PC did for desktop machines: allow software to be sold for, and data to be exchanged over, a medium compatible across a broad range of portables from a long list of manufacturers worldwide.

With notebook and low-end laptops expected to constitute half of Japan's PC market by 1994—and perhaps a third of PC sales around the world by then—approval of the standard is especially important to U.S. computer and software companies. Proponents of the PC Card concept hope that, with the standard approved, software vendors will quickly begin porting applications to the cards and users here and in Japan will embrace the new technology.

The PC Card standard is being forged by the Personal Computer Memory Card International Asso-

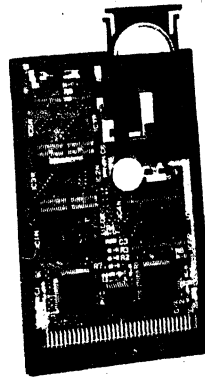
ciation (PCMCIA) and the MITI-affiliated Japan Electronics Industry Development Association (JEIDA), which includes about 40 major Japanese companies. The 70-member PCMCIA includes nearly all of the personal computer industry's movers and shakers, with IBM, Lotus Development Corp. and Microsoft Corp. playing particularly active roles.

Today and tomorrow in Seattle, Microsoft will host the May meeting of the PCMCIA, at which members are expected to approve a draft agreed to in Tokyo on May 10 by PCMCIA members and the memory card working group of JEIDA. The agreement specifies the JEIDA V. 4.0 format, 68-pin card; the DOS file format; a means for the system to know what kind of card it is dealing with; and other hardware and system-software specifications.

It's expected that Poquet Computer's (Sunnyvale, Calif.) Poquet PC, a palmtop unit that accepts the IC cards, will spearhead penetration of the U.S. market.

Dan Sternglass, founder of Datatook Inc. (Ithaca, N.Y.), which manufactures a series of IC-card reader/writers and programmers, said: "What's going to drive the

market first are portable systems, starting with the Poquet. We still have to see how much of the market will be penetrated by the handheld-type computers. Then,



Fujitsu's version of the credit-card-size 'PC Card.'

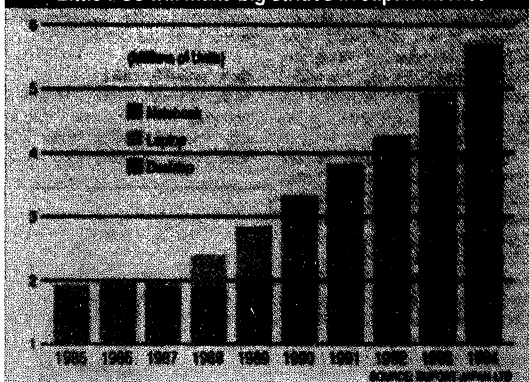
PC Card standard drafted

if everyone owns a handheld, IC cards might be used in desktops."

A host of notebook machines coming to market in Japan is expected to fuel use of the new cards there.

Last week at the Japan Business Show, NEC Corp., Fujitsu Ltd. and Mitsubishi Electric Corp. all introduced powerful new notebook computers that include IC reader/writers compatible with the new 68-pin standard. Fujitsu offered a half dozen applications in ROM-based IC card format, along with various data file cards using SRAMs.

Little PCs will make big strides in Japan market



applications. The system it now uses is upward-compatible with the new standard.

John Reimer, the Fujitsu Microelectronics (San Jose, Calif.) memory card manager who serves as the PCMCIA's chairman, said he got interested in IC cards because of Fujitsu's investment in Poqet Computer. Fujitsu is doing back-up manufacturing for Poqet in Japan and is a card supplier to Poqet.

Reimer said he expects the success of Poqet's \$2,000 system to drive demand for IC cards in the United States for the time being. But, he said, ultimately, "every executive will want to have some kind of notebook computer," and that will create the market for IC cards.

How standard came about

Tokyo — The people who hammered out the IC card standard between Japan and the United States described it as an exercise in quick compromises—and a demonstration that good will exists in abundance between Japan and America.

Basically, the standard took most of the hardware specifications developed over the past five years by the Japanese and added software standards prompted by the U.S.'s Personal Computer Memory Card International Association (PCMCIA).

Fujitsu Microelectronics memory card manager John Reimer said Poqet Computer executives realized a year ago that a standard for the cards would expand the software base for their palmtop machine. Reimer—described as "the driving force" behind the formation of the PCMCIA—sent out letters in June 1989 about the new association and got quick acceptance from U.S. companies. About 70 companies joined PCMCIA.

Late last year, the Americans sent a letter to the Japan Electronic Industry Development Association (JEIDA), an association that focuses on personal computers. The JEIDA working committee, already five years in existence, sent 10 Japanese representatives to the PCMCIA's January meeting, in Dallas.

Japanese and American executives began crossing the ocean each month, attending each other's meetings. The Americans, accustomed to voting on issues after a period of discussion, worried that the Japanese would "want to keep talking, talking, talking, until they reached a consensus," Reimer said.

Instead, the Japanese accepted U.S. proposals about the pin lengths for the 68-pin connector; Japanese software companies—including Microsoft Japan, Just Systems and Ascii Corp.—provided important input to the software discussions.

—David Lammers



Reimer: Instigator.

New notebook wave

Those A-4-sized systems are in the 6-lb. (2.7 kg) range, similar in size to the popular "Dynabook" from Toshiba. One model of NEC's PC98 Note is also the first built around Intel's 386SX processor, partly because it expects that users of notebook computers will want to run the same Windows interface they use on their desktops.

Though the Dynabook does not include an IC card slot, future Toshiba systems will. Both the chairman of the JEIDA working group and the software subcommittee are Toshiba executives.

Though several companies are developing notebook machines in the United States, the portable field here is currently focused on the larger, heavier laptop PCs, like those made by Zenith Data Systems (now part of the Bull Group), Compaq and Tandy.

But that could change. According to Japanese sources, IBM Corp. is expected late this year to introduce a notebook computer, now under development at IBM Japan, that would use IC cards manufactured at a new IBM plant in Toronto. By using the PC Card, IBM might try to leapfrog its competitors and make a comeback in portables, just as it's trying to do in workstations. The June meeting of the PCMCIA will be hosted by IBM in Toronto.

For now, hopes for the PC Card's success in the U.S. market rest mainly with the Poqet computer. Poqet is pioneering IC card use with versions of Lotus 1-2-3, an integrated package called AlphaWorks from Alpha Software (Burlington, Mass.), and other

Not an expansion card

The PC Card should not be confused with the memory expansion cards that some vendors offer for adding DRAM to laptops. Partly to avoid confusion with these DRAM cards, PCMCIA uses the name "PC Card" and has developed a logo that will mark the cards that comply to the standard.

PC Cards, rather than being analogous to add-on memory, are actually a form of removable media, like the 3½-inch diskettes being used in today's laptops. Like floppies, they

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Japan/U.S. PC Card standard at hand

not only store programs and data but will allow dissimilar notebook machines to share that data, thanks to the standard. Further, by using PC Cards, notebook computers could exchange data with pocket computers or even with new versions of the electronic organizers which have sold millions in Japan, but have been based to date on proprietary card schemes.

IC cards are seen as the key to eventually replacing floppy disk drives in notebook computers. Ryozo Yamashita, an ASCII Corp.

target date. With the PC Card, he noted, the system CPU can directly access the memory on the card itself. "That will eliminate the huge memory needed on the main unit," he said.

Once a large installed base of hardware is on the market, more software will be ported to PC Cards, he said. However, software companies are cautious because of the high cost of putting software into silicon. A 1-Mbyte ROM card that costs \$50-70 now may come down to half that over the next year, as 8- and 16-Mbit

to implement "execute in place" (XIP). XIP permits a small system to run software stored on a PC Card and access memory on the same card, rather than relying solely on the system's memory. XIP is an important issue for the optimal execution of large programs adapted to IC cards, such as Lotus 1-2-3 running on the Poquet system. The issue brings to the IC card level a bigger issue: how to get around the 640-kbyte barrier of the original PC architecture while maintaining PC compatibility, said Yoshinobu Akimoto, an engineer at Microsoft Japan.

Mike Dreyfoos, chief engineer of Microsoft's MS-DOS division, who is active in the PCMCIA, and Jim Prelack, a Lotus Development executive who serves as president of PCMCIA, are both said to be taking a "market oriented" approach toward resolving the snag.

An informal meeting on the XIP issue, held here May 14, resulted in some progress, sources here said. Even without an immediate agreement on XIP, companies can take the basic standard and begin porting software and building IC card-based hardware.

"Both companies [Lotus and Microsoft] realize we've got to get the show on the road," said Fujitsu's Reimer.

U.S. to get the jump

T. Shigeta, a senior staff manager at Microsoft Japan, said the U.S. market may adopt the software cards faster than the Japan market. In Japan, Fujitsu, NEC and other companies all support proprietary versions of MS-DOS, making applications incompatible. That fracture is continuing down to the notebook and palmtop systems, which will support proprietary versions of MS-DOS.

"The big issue is not only the high cost of the [IC card-based] software, but having to support different cards for the different architectures here in Japan," Shigeta said.

He believes the data cards will sell well in Japan. "The importance of this standard is that notebook, laptop- and desktop-type computers will be able to exchange data on the cards."

He predicted small ISVs will maintain a cautious stance toward IC card-based software. The lack of software support has hurt pre-

vious attempts to market IC card-only notebook computers, including NEC's "UltraLite," sold in the U.S. market, Epson's "Note Executive" and Sharp's "Brain."

Asked if Microsoft will port its applications to the cards, Shigeta said, "I can't say anything explicit, but from the level of our activity in JEIDA and PCMCIA, you can see that we see a bright future in IC memory cards."

Ryosuke Takahashi heads up the five-person IC card team at DuPont Japan Ltd. As a neutral player in between Japan's competing electronics companies, DuPont buys memories, has them assembled by third-party suppliers and markets the IC cards to Japan's computer makers. DuPont also supplies most of the two-piece (header and female) connectors used in the JEIDA format cards.

A 1988 market study done by DuPont and Nomura Research Institute predicted that the IC card market in Japan would grow by a 33 percent compound average growth rate, rising to about \$1 billion in 1995. That's about five times larger than the total expected for 1990, and the Japan market estimate preceded the unexpected joint standard with the U.S.

In about two years, when flash EPROM-based cards are in wider use, the price of most of the cards will drop to half, Takahashi said. Now, a 512-kbyte SRAM card is sold to OEMs for about 40,000 yen, or about \$240.

Takahashi believes that palmtop-size computers will be the biggest market for the next couple of years, with most notebook computers continuing to use floppy disk drives. Beyond that, some companies may migrate to IC card-based notebooks, sans floppy drive.

But other markets will be important. Already, robots and measurement equipment, laser printers, and medical equipment use IC cards. "My personal view is the digital still cameras will be a big market for IC cards in years to come, replacing film," Takahashi said. Toshiba and Fuji Film already have a camera on the market that uses IC cards, and Sony may change from a floppy to a card based still camera. The FBI put in a major order for Sony's camera last week.



Dynabook engineer Terry Moore (left), key figure in standards development, with president Dan Sternglass and PC Card.

(Tokyo) engineering vice president, attended several PCMCIA meetings in the United States and said he grew tired of carrying the six-pound Dynabook along in his rucksack.

"With a floppy disk drive in the computer, there is not much more than can be done to reduce the weight. And a floppy drive consumes a lot of power."

But before the ubiquitous floppy is designed out of notebook computers, software companies must port more software to PC Cards. Yamashita said he believes the market will be driven first by the Poquet computer (though he believes the Poquet keyboard needs improvement) and later this year by less expensive portable computers.

"By the end of this year the IC memory card will be used as the primary media on pocket-type computers from many companies," Yamashita said, with the fall Comdex show in November a

mask ROM chips proliferate. But compared with distributing applications on floppies, ROM IC cards are a big financial risk, especially for the thousands of small software companies.

Japan's software houses, including ASCII, have a lot of experience selling Nintendo game software stored in ROM, Yamashita said. But Nintendo software can sell in millions of units, while the computer market is marked by higher prices but smaller unit volumes. The big merit of IC card software, he said, is that it cannot be copied by individuals, giving software companies the incentive to strive for potentially higher margins.

One other potential hurdle for getting software into PC Cards could be settled at this week's PCMCIA meeting. There, Microsoft and Lotus Development Corp., two of the biggest promoters of the standard, will try to work out their differences on how

ASCII's Yamashita said a potentially huge market for IC cards is in distribution of specialized information. A number of Japanese software, printing and publishing companies have initiated the International Card Media Publishing Association. Stock exchange data and financial news, train timetables and other forms of changeable data could be stored on IC cards. One idea is to provide vending machines that would download data on to a card at a train kiosk or newsstand.

"When flash memory gets cheap enough, then you might stop by and download certain kinds of news and view it on the train; information could be personalized," Yamashita said.

The way to look at IC cards is as the next step in the evolution of computer media, from paper tape to magnetic tape and floppy/hard/optical disks, and now to a silicon-based media, he said.

Mask ROMs normally are used to store software in IC cards. The market for Nintendo game cartridges has helped drive the price of a 1-Mbyte ROM card down to about \$60 to \$70. That may drop by half over the next year.

Before IC cards become popular the cost of data storage cards must come down, an area where flash EPROMs are expected to play a key role.

"All of the PCMCIA members expect that flash will replace a good chunk of the SRAM-based cards," said Reimer, noting that Intel Corp., Texas Instruments,

Inc. and Toshiba Corp.—the larger companies in the flash memory field—are active members of PCMCIA. Fujitsu and other Japanese companies have major flash development efforts under way.

William Howe, president of Intel Japan, said IC-card related product announcements from Intel, based on flash EPROMs, "are not very far away." Though he said Japanese semiconductor companies have accelerated their own flash development efforts, they are turning to Intel for flash EPROMs to be built into IC cards.

Takemae said flash memories will make an impact on IC card pricing, probably beginning next year.

"In the last few months the interest from our customers in flash (for use in IC cards) has increased by an order of magnitude. It's not just Company A or Company B, it's everybody," Howe said.

Though flash is considerably more expensive than EPROM memory now, Howe said he expects the price to come down to 10 to 15 percent above the tags on EPROMs, and far less than the price of SRAMs now used in IC data cards.

Yoshihiro Takemae, a Fujitsu Ltd. semiconductor manager who served as chairman of the JEIDA hardware subcommittee, said flash memories will make an impact on IC card pricing, probably beginning next year. The PC Card pin layout scheme reserves pin No. 18 for programming the card, which would accommodate the 12 volts needed to electrically rewrite a flash memory.

While research continues into ways in which sectors of a flash EPROM can be selectively erased, Takemae said, "I think that deletions can better be handled by the software. People should think about the format and handling of the IC memory card just as they think about floppy disks now."

The hardware specifications included a write-protect switch, the position of the battery, a green-yellow-red light system to indicate the strength of the battery, and a variety of electrical specifications, all of which can be obtained from the PCMCIA once the standard is published.

The decision to move from 60-pin cards, which had been used by several Japanese companies, had been agreed upon earlier by the JEIDA group in its V 3.0 specifications.

The cards are about 3.3 mm thick, so that four-layer, double-sided cards can be housed. Fujitsu and other companies have been putting 20 to 24 chips on the double-sided cards, using TSOP (thin small-outline packages), an emerging form of surface-mount packaging, Reimer said.

Takemae said the most difficult issue facing the hardware group was how to deal with "hot insertion/hot removal," i.e., pulling out a card while the system is still operating, which can result in data loss. A major future issue is how to develop an I/O specification so that interface cards can be built into portable computers, "talking to" fax machines, telephones and pagers, printers, and other external devices.

Yamashita, of ASCII, and Terry Moore at Databook worked together to develop the META card interface format, with input from Dreyfoos of Microsoft.

META is a header format that tells the system what kind of card (such as an application or data card) is in the slot, what kind of semiconductor memory—and how much of it—is on the card, and so on.

"We really have worked hard so the consumer can just plug in the card and make it look like a floppy disk. We want this to be a consumer product," Sternglass said.